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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|------------------------|---------------------|------------------|
| 10/743,896 | 12/22/2003 | Dennis William Mueller | 191314-1011 | 1987 |
| 24504 | 7590 | 04/21/2004 | EXAMINER | |
| THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP 100 GALLERIA PARKWAY, NW STE 1750 ATLANTA, GA 30339-5948 | | | HO, ALLEN C | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2882 | |

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/743,896 | MUELLER ET AL. | |
| | Examiner | Art Unit | |
| | Allen C. Ho | 2882 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 6-18 is/are rejected.
- 7) ☒ Claim(s) 2-5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>22122003</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

- (1) Page 1, line 6, "--now U. S. Patent No. 6,697,453--" should be inserted after the filing date.
- (2) Page 7, line 5, "34" after "power switch" should be replaced by --44--.
- (3) Page 7, line 6, "44" should be replaced by --34--.
- (4) Page 10, line 14, "36" should be replaced by --34--.
- (5) Page 10, line 25, "120" should be replaced by --12--.
- (6) Page 11, line 13, "94" should be replaced by --96--.
- (7) Page 17, line 17, "80" should be replaced by --96--.
- (8) Page 17, line 18, "80" should be replaced by --96--.

Appropriate correction is required.

Claim Objections

2. Claims 1, 2, 5, 6, 13, and 16 are objected to because of the following informalities:

Claims 1, 2, 5, 6, 13, and 16 are objected to because of the following informalities: The claims used the phrase "configured to". Language, such as "adapted to", that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation. MPEP § 2106. The applicants are advised to amend the claims so that the limitations are positively stated. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 6-9, 11, and 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Hayashi *et al.* (U. S. Patent No. 4,426,718).

With respect to claim 1, Hayashi *et al.* disclosed an apparatus for examining the internal structure of a material, the apparatus comprising: an x-ray source (18); an x-ray detector (22); and a mounting plate (33) having the x-ray source and the x-ray detector rigidly mounted thereto.

With respect to claim 6, Hayashi *et al.* disclosed the apparatus of claim 1, further including: an x-ray source controller in communication with the x-ray source, the x-ray source controller providing electrical power and initiation and operation parameters to the x-ray source (this is inherent).

With respect to claim 7, Hayashi *et al.* disclosed the apparatus of claim 1, further including: a storage device in electrical communication with the x-ray detector, wherein the storage device stores information related to the angular dispersion of the diffracted x-rays (this is inherent).

With respect to claim 8, Hayashi *et al.* disclosed a method for examining the internal structure of a component, the method comprising the steps of: aligning an x-ray source (18) and an x-ray detector (22) in a rigid and predetermined orientation; irradiating a target area (10) of a

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surface of a component with an x-ray beam (20) from the x-ray source, wherein the x-ray beam is incident upon a particular crystallographic plane of atoms at the Bragg angle for that plane; detecting x-rays diffracted (21) from the target area of the component with an x-ray detector (22); determining an indicator (d-spacings, crystal structure, etc.) of the internal structure from the intensity as a function of angular dispersion of the diffracted x-rays detected by the x-ray detector.

With respect to claim 9, Hayashi *et al.* disclosed the method of claim 8, further including the steps of: enumerating the number of x-rays detected by the x-ray detector over a range of angles; and parameterizing the number of x-rays detected as a function of angle (this is just an x-ray diffraction spectrum).

With respect to claim 11, Hayashi *et al.* disclosed the method of claim 8, including the step of: identifying the composition (crystal structure) of the component.

With respect to claim 13, Hayashi *et al.* disclosed the method of claim 8, further including the step of: mounting the x-ray source and the x-ray detector rigidly and removably (if they could be mounted, they could be removed) on a mounting plate (33).

With respect to claim 14, Hayashi *et al.* disclosed the method of claim 8, further including the step of: determining the remaining lifetime of the component using the internal structure indicator (half-value width b) and a database (65), wherein the database includes structure indicators having lifetimes associated therewith for multiple test objects (column 6, lines 10-18).

With respect to claim 15, Hayashi *et al.* disclosed the method of claim 8, wherein the component is part of a system and is scanned *in-situ* (since it is portable).

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5. Claims 1, 6-9, 11, 13, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Ogiso (U. S. Patent No. 3,868,506).

With respect to claim 1, Ogiso disclosed an apparatus for examining the internal structure of a material, the apparatus comprising: an x-ray source (2); an x-ray detector (3, 4, 5); and a mounting plate (6) having the x-ray source and the x-ray detector rigidly mounted thereto.

With respect to claim 6, Ogiso disclosed the apparatus of claim 1, further including: an x-ray source controller in communication with the x-ray source, the x-ray source controller providing electrical power and initiation and operation parameters to the x-ray source (this is inherent).

With respect to claim 7, Ogiso disclosed the apparatus of claim 1, further including: a storage device in electrical communication with the x-ray detector, wherein the storage device stores information related to the angular dispersion of the diffracted x-rays (this is inherent).

With respect to claim 8, Ogiso disclosed a method for examining the internal structure of a component, the method comprising the steps of: aligning an x-ray source (2) and an x-ray detector (3, 4, 5) in a rigid and predetermined orientation; irradiating a target area (1) of a surface of a component with an x-ray beam (a) from the x-ray source, wherein the x-ray beam is incident upon a particular crystallographic plane of atoms at the Bragg angle for that plane; detecting x-rays diffracted (b, c, d) from the target area of the component with an x-ray detector (3, 4, 5); determining an indicator (d-spacings, crystal structure, etc.) of the internal structure from the intensity as a function of angular dispersion of the diffracted x-rays detected by the x-ray detector.

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With respect to claim 9, Ogiso disclosed the method of claim 8, further including the steps of: enumerating the number of x-rays detected by the x-ray detector over a range of angles; and parameterizing the number of x-rays detected as a function of angle (this is just an x-ray diffraction spectrum).

With respect to claim 11, Ogiso disclosed the method of claim 8, including the step of: identifying the composition of the component (α -phase and γ -phase of a carbon steel, column 1, lines 12-45).

With respect to claim 13, Ogiso disclosed the method of claim 8, further including the step of: mounting the x-ray source and the x-ray detector rigidly and removably (if they could be mounted, they could be removed) on a mounting plate (6).

With respect to claim 15, Ogiso disclosed the method of claim 8, wherein the component is part of a system and is scanned *in-situ* (column 1, lines 41-45).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi *et al.* (U.S. Patent No. 4,426,718) as applied to claim 9 above.

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With respect to claim 10, Hayashi *et al.* disclosed the method of claim 9. However, Hayashi *et al.* failed to teach that the indicator of the internal structure is a parameter used for parameterization of the diffraction spectrum.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to parameterize the diffraction spectrum using an indicator of the internal structure, since such a spectrum would reveal a distribution of the indicator.

8. Claims 11 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi *et al.* (U. S. Patent No. 4,426,718) as applied to claim 8 above.

With respect to claims 11 and 12, Hayashi *et al.* disclosed the method of claim 8. However, Hayashi *et al.* failed to teach that the method further including the steps of: measuring across a frequency range the intensity of light fluoresced from a composition to determine the spectral characteristics of the composition; and comparing the spectral characteristics of the composition with spectral characteristics of known materials.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to measure x-ray fluorescence from a composition, since x-ray fluorescence is indicative of the chemical elements, which together with the crystal structure revealed by the diffraction data, would positively identify the composition. Furthermore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to compare the fluorescence spectrum with fluorescence spectra of known materials, since a person would be motivated to identify the chemical elements by matching the fluorescence spectrum of the composition with the fluorescence spectra of known materials.

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9. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogiso (U. S. Patent No. 3,868,506).

With respect to claim 16, Ogiso disclosed an apparatus for non-destructively examining the internal structure of a component, the apparatus comprising: an x-ray source (2); an x-ray detector (3, 4, 5); and a mounting system (6) having the x-ray source and the x-ray detector rigidly mounted thereon in multiple configurations (different angles).

However, Ogiso failed to teach that the apparatus comprises a housing defining an exterior surface and a generally hollow interior having the mounting system therein, the housing defining a window extending from the interior to the exterior surface.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a housing for the apparatus, since a person would be motivated to shield the operator from scattered radiations.

With respect to claims 17 and 18, Ogiso disclosed the apparatus of claim 16. However, Ogiso failed to teach that the mounting system is an interior wall of the housing, or the mounting system includes a plate mounted to an interior wall of the housing.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide an interior wall as the mounting system, or provide a plate mounted to an interior wall, since a person would be motivated to integrate the mounting system and the housing into a single rigid unit.

Allowable Subject Matter

10. Claims 2-5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

With respect to claims 2-4, the prior art fails to teach or fairly suggest the apparatus of claim 1, wherein the mounting plate has a finite number of alignments for mounting the x-ray source and the x-ray detector as claimed.

With respect to claim 5, the prior art fails to teach or fairly suggest the apparatus of claim 1, further including a photo-spectrum analyzer mounted to the mounting plate as claimed.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- (1) Hossain *et al.* (U. S. Patent No. 6,173,036 B1) disclosed an x-ray fluorescence analyzer comprising a photo-spectrum analyzer (multi-channel analyzer).
- (2) Isobe *et al.* (U. S. Patent No. 5,272,746) disclosed a method of evaluating a degree of fatigue in a structural material.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached at (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allen C. Ho
Patent Examiner
Art Unit 2882